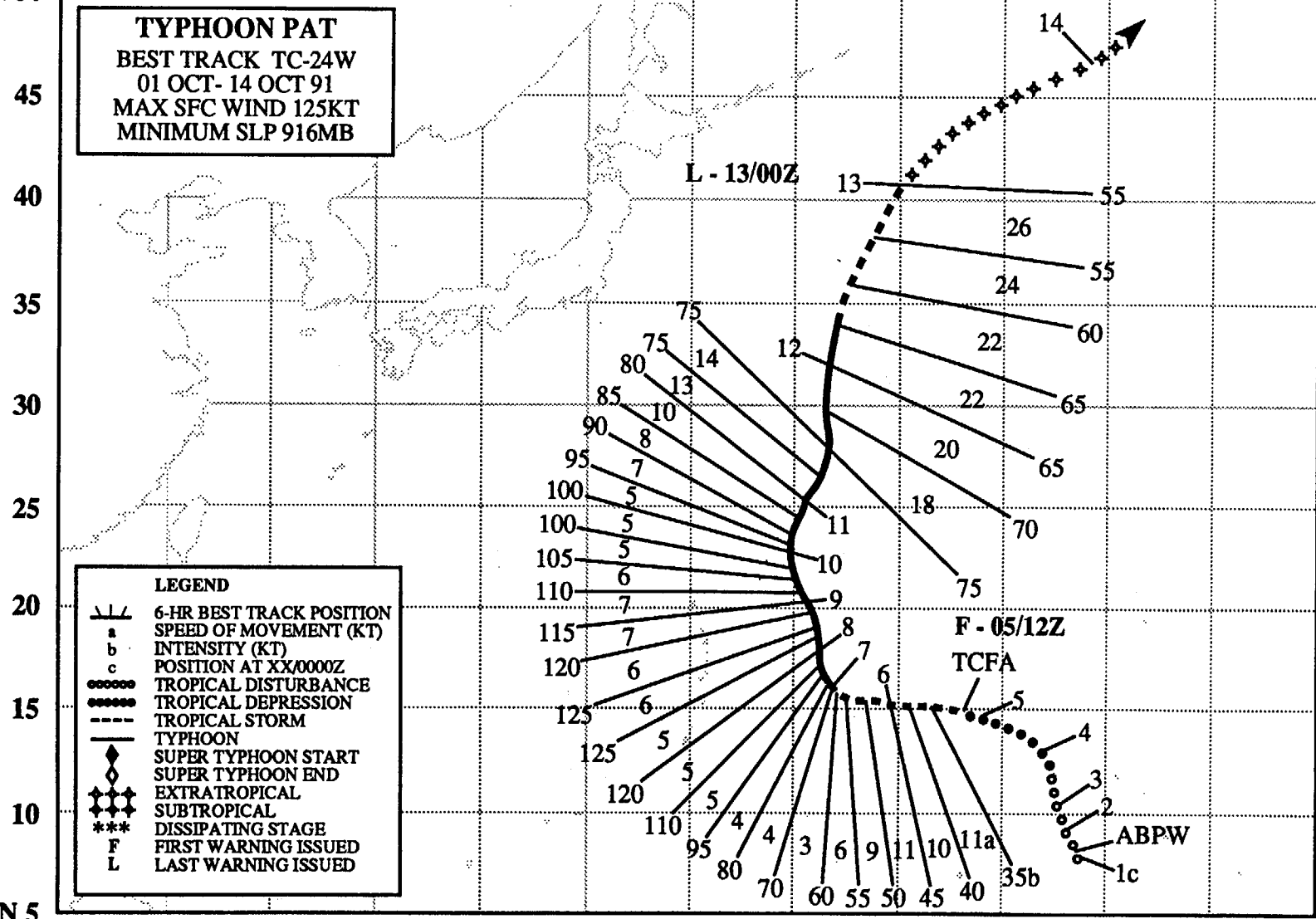


E 115 120 125 130 135 140 145 150 155 160 165 170 175 E  
N 50

**TYPHOON PAT**  
BEST TRACK TC-24W  
01 OCT- 14 OCT 91  
MAX SFC WIND 125KT  
MINIMUM SLP 916MB

**LEGEND**  
 \ / \ 6-HR BEST TRACK POSITION  
 a b c SPEED OF MOVEMENT (KT)  
 INTENSITY (KT)  
 POSITION AT XX/0000Z  
 oooooo TROPICAL DISTURBANCE  
 oooooo TROPICAL DEPRESSION  
 ----- TROPICAL STORM  
 ----- TYPHOON  
 ◆ SUPER TYPHOON START  
 ◇ SUPER TYPHOON END  
 + + + EXTRATROPICAL  
 + + + SUBTROPICAL  
 \*\*\* DISSIPATING STAGE  
 F FIRST WARNING ISSUED  
 L LAST WARNING ISSUED



120

N 5

## TYPHOON PAT (24W)

### I. HIGHLIGHTS

Typhoon Pat developed at the same time in early October as Typhoon Orchid (23W). Its rapid intensification phase was correctly predicted by a recently developed pixel-counting forecast scheme. Although Pat initially trailed Orchid as the two tropical cyclones matured, it accelerated and was the first to become extratropical.

### II. TRACK AND INTENSITY

After Typhoon Nat (22W) dissipated over southeastern China and the monsoon trough re-established itself eastward into the Caroline and Marshall Islands, two tropical disturbances formed in this trough. These disturbances were discussed on the 010600Z October Significant Tropical Weather Advisory. Pat developed from the disturbance in the western Marshall Islands, and the other disturbance to the west became Typhoon Orchid (23W). Initially, tropical cyclone development was hampered by vertical wind shear. On 4 October, vertical shear decreased and the depression began to slowly intensify. Based on a steady increase in convective organization, a Tropical Cyclone Formation Alert was issued at 050630Z, followed by the first warning at 051200Z. Pat intensified at a normal rate of 20 kt (10 m/sec) per day until 061800Z, when it began to rapidly intensify (Figure 3-24-1). At about the same time, the ridge weakened to the north, allowing the typhoon's track to change from west-northwestward to north-northwestward for the next 72 hours. Typhoon Pat attained a maximum

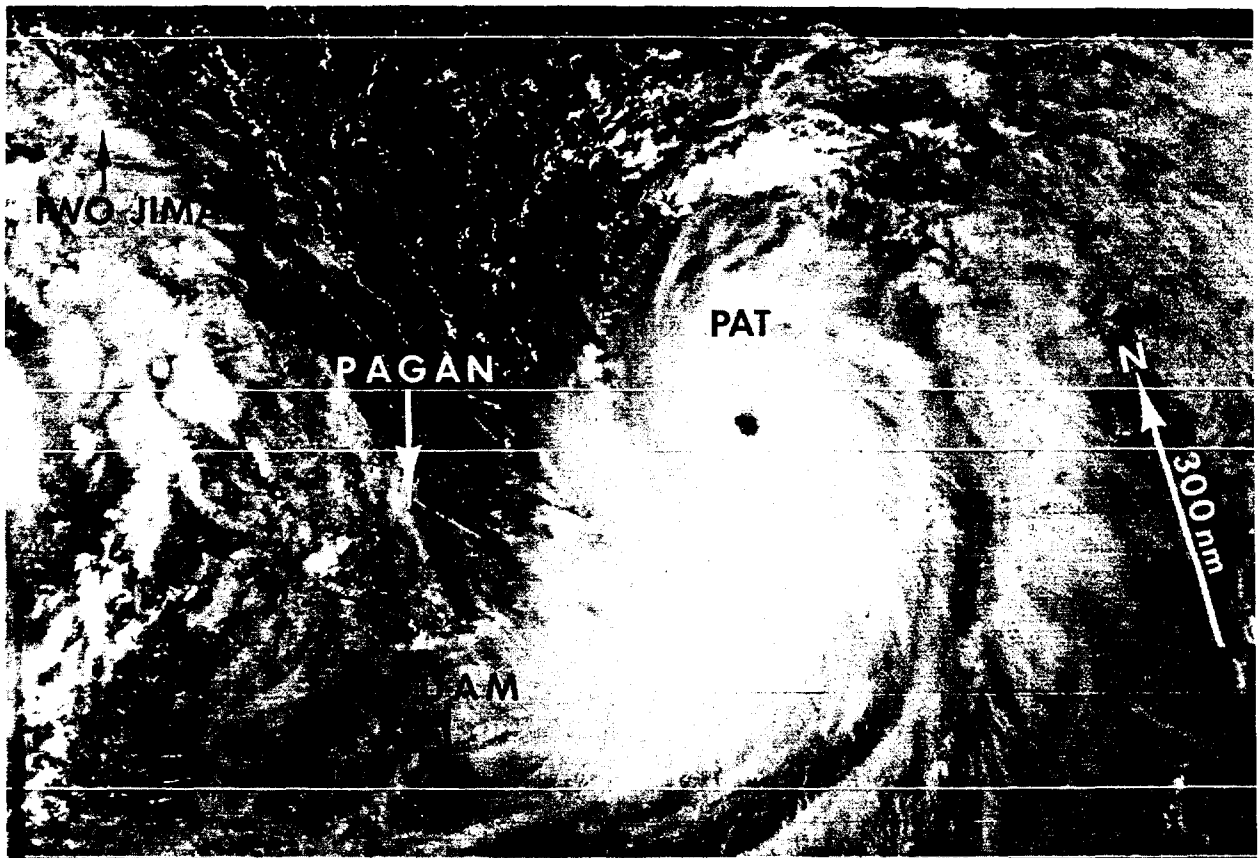


Figure 3-24-1. Typhoon Pat nears its maximum intensity (072237Z October DMSP visual satellite imagery).

intensity of 125 kt (64 m/sec) on 8 October, approximately 320 nm (590 km) east of Pagan Island in the northern Mariana Islands. As the system began to weaken, the subtropical high located to the east maintained its strength and position. As a result, Pat began to approach Orchid, which was recurving south of Japan. By 100000Z, the two systems had closed to within 1000 nm (1850 km) of each other. Instead of undergoing binary interaction and orbiting around a common midpoint, Pat and Orchid maintained their separation and moved in tandem to the north-northeast (Figure 3-24-2). Although initially the trailing cyclone, Pat accelerated poleward first, and the slow-moving Orchid followed in its wake. Both became extratropical at 130000Z.

### III. FORECAST PERFORMANCE

Interaction with Orchid was the most difficult portion of Pat's track to forecast. Initially the prognostic messages indicated that Orchid, which had recurved first and was located further north than Pat, was more likely to be the first to accelerate northeastward. However, Pat became the first to accelerate. Surprisingly, climatology was the best-performing forecast aid at 72 hours, with a forecast error of only 201 nm (370 km).

The start of Pat's rapid intensification on 7 October was successfully predicted by a new pixel-counting technique (Mundell, 1990) which compares the ratio of inner-radius convection to outer-radius convection to forecast rapid intensity change (Figure 3-24-3). Overall intensity forecasting errors were slightly higher than the average.

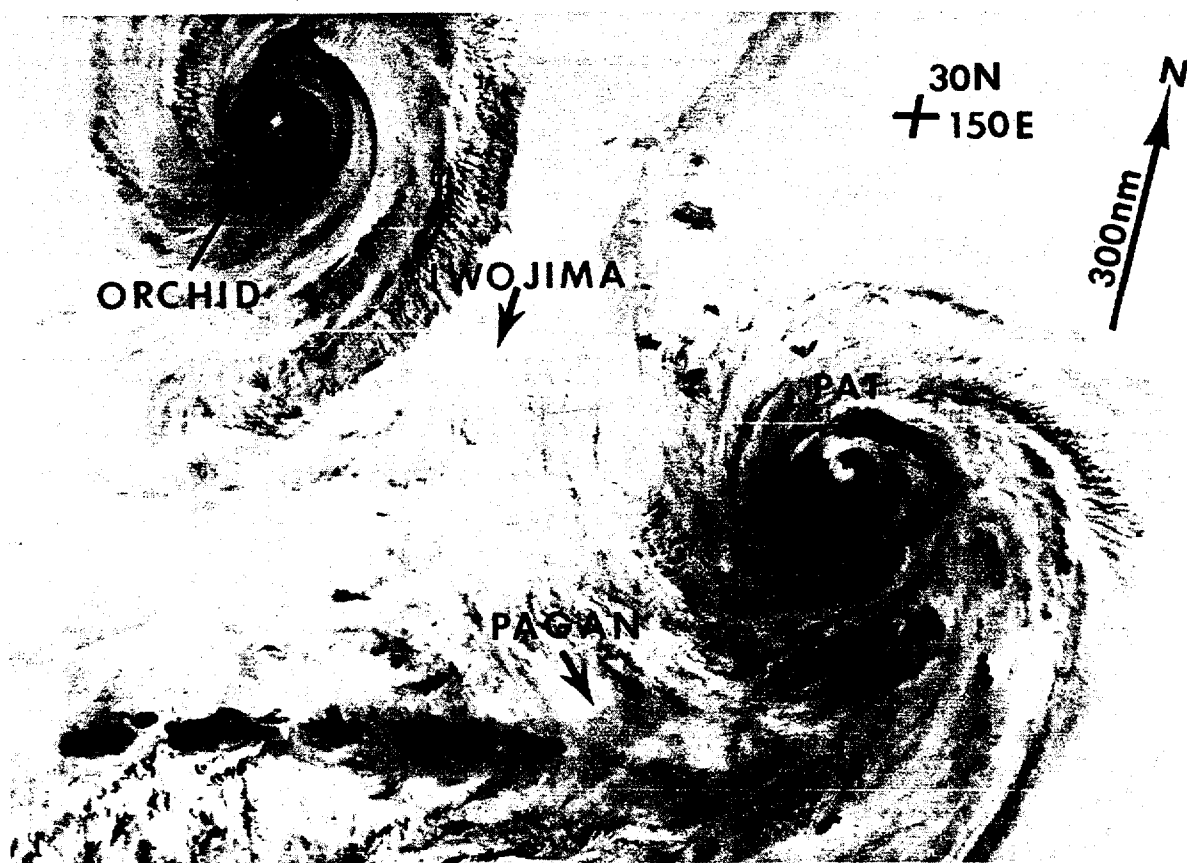


Figure 3-24-2. Typhoons Pat and Orchid (23W) are both moving north-northeastward in tandem (101011Z October DMSP infrared imagery).

#### IV. IMPACT

JTWC did not receive any information of direct impacts of Pat. However, indirectly, the slow movement of Pat and Orchid set up significant long period ocean swells that gave Guam some of its largest surf of the year. At least two people lost their lives on Guam due to the high surf.

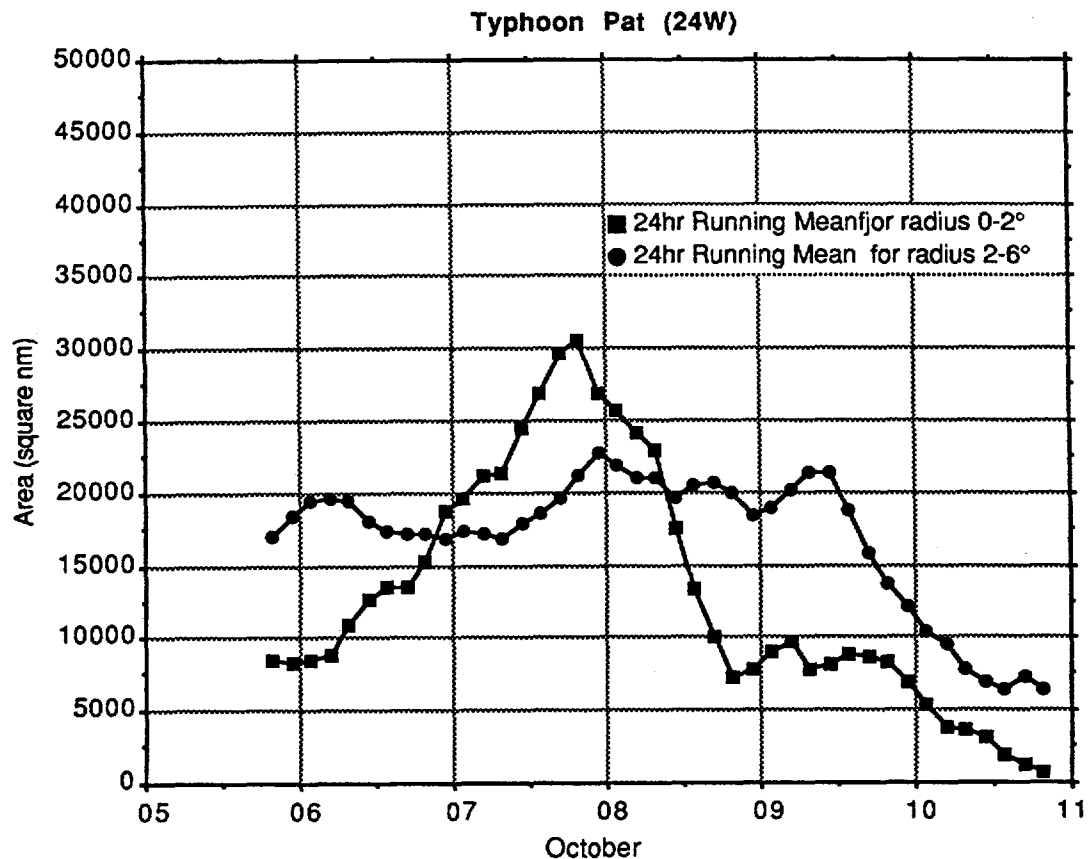


Figure 3-24-3. Time series of the relative amounts of inner convection (measured within 2° of the cloud system center) colder than -75°Celsius and outer convection (measured within 2°-6° of the center) colder than -65°Celsius. According to Mundell (1990), when the lines representing 24-hour running mean averages of both inner and outer convection cross, rapid intensification is likely to occur over the next 12 hours.